

Lesson 4.2: Life Science – Cells & Cell Division

Weekly Focus: Reading Comprehension
Weekly Skill: Group Presentations

Lesson Summary: This week students will learn about the basics of cells and the process of cell division through group work and group presentations.

Materials Needed:

- Reading Comprehension and Jigsaw Group Presentations **Unit 4.2 Handout 1**
- **Extra Work/Homework—Application of information from group presentations Unit 4.2 Handout 2** (Spectrum Science, Grade 6, pages 46-47)

Objectives: Students will be able to...

- Demonstrate an understanding of the basics in cell and cell division
- Apply understanding of cells and cell division

College and Career Readiness Standards: RI, RST, WHST, SL

ACES Skills Addressed: EC, LS, ALS, CT, SM, N

Notes: Please review and be familiar with classroom routine notes for: reading for fluency strategies (**Routine 2**), summarizing techniques (**Routine 4**), and self-management skills (**Routine 1**). The notes will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be two short answer portions (suggested 10 minutes each) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.

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Activities:

Warm-Up: Journal Writing

Time: 10 - 15 minutes

- As students enter the class, have the following written on the board or overhead **“In physical science, a force is a push or pull upon an object resulting from the object's interaction with another object.”** Have students create a **“KWL”** chart on a piece of notebook paper (below). This helps to activate students' prior knowledge by asking them what they already **Know** (column 1); students (collaborating as a classroom unit or within small groups) set goals specifying what they **Want** to learn (column 2); and after reading students discuss what they have **Learned** (column 3).
- Students apply higher-order thinking strategies which help them construct meaning from what they read and help them monitor their progress toward their goals.

KWL Chart:

K - What (else) do I KNOW?	W - What do I WANT to know?	L - What did I LEARN?

Activity 1: Jigsaw Reading Cells (Unit 4.1 Handout 1)

Time: entire class period (break into two sections)

- Distribute all pages of the activity (**Unit 4.2 Handout 1**) to students.
- Instruct students that today's lesson has a lot of material to cover (9 pages) and one way to cover so much information is to work in groups. Have students break into 4 groups (A, B, C, D). Each group will become experts in a different area of the reading.

Group A = Cell Theory – page 1 **Group B** = Organelles – pages 2 & 3
Group C = Diffusion and Osmosis - page 4 **Group D** = Cell Division and Reproduction – pages 5, 6

Page 7 is vocabulary for all, page 8 is a graphic that all students should use and write what each image represents, page 9 is the note page for group presentations.
- Ask each group of students to read their assigned sections silently and then summarize and share their findings within their group. Explain how they are reading to become experts of the material and after discussing it in their groups, they will then share their knowledge from their section with the other groups. The other groups will take notes on the information presented on page 9.
- While students are reading, circulate to the groups and discuss with students that when reading for comprehension, there are many strategies to use: read the title to predict what the reading is about; look at the words in bold and their definitions within the context of the reading or with the vocabulary sheet at the end of **Unit 4.2 Handout 1**; if there are images, look at them to get a better understanding; while reading remember to ask “What is this all about?” As you circulate, make sure they understand the information presented and see if there are any questions.
- Tell students when they are done reading silently, they should turn their papers over and discuss and summarize what their section is about to others in their group. They should also discuss how they would like to present the materials to the other groups. Explain that the other groups will have to take notes, or summarize the information presented in order to understand it fully. Students should be reminded they need to present the information and not read from it directly.

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6) After groups have read and discussed their section in groups, each group will present their section of the reading to the whole class. The other groups will take notes of the material presented on page 9 of **Unit 4.2 Handout 1**. **Instruct students to keep their pencils down during each group's presentation. After each group is done talking, then ask the rest of the class what was said. Once students have collectively summarized the group's information aloud, then have individuals write a few sentences on their note sheets about the presented topic.**

7) Remind students that they need to have a good foundational knowledge of cell theory, parts of cells, and cell division in order to answer some questions that may be on the GED 2014 test.

8) If there is extra time at the end of group presentations, have students read passages in pairs to promote reading fluency. As a challenge, students can also write a 3 – 5 sentence summary of all of the material presented. (Use *Routine 4: Summarizing Techniques Handout*)

9) If there is more time, students should practice writing a short response (10 – 15 minutes) about what is happening in the images on page 8. They can write this up in a notebook and share with partners or as a whole class.

Break: 10 minutes

Wrap-Up: Summarize

Time: 5 minutes

Have students turn to a partner (or write in their journals) about what they have learned today about cells. Ask them to tell a partner one thing they learned or that is new to them from today's lesson. *Note: Use Routine 4 Handout*

Extra Work/Homework: Unit 4.2 handout 2

Time: 30 minutes outside of class

Students can read further about cell division with the extra work/homework activity (Spectrum Science Grade 6, pages 46-47). This is an excellent opportunity for students to review today's material in an independent manner.

Differentiated Instruction/ELL Accommodation Suggestions

Activity

If some student groups finish early, they can turn their paper over and summarize the reading passage.

Activity 1,

Teachers should be aware that ELLs could have some difficult time with some of the vocabulary in the readings. You should encourage them to use a dictionary or the vocabulary sheet to gain a better understanding.

Activity 1

Online Resources:

If students have Internet connection, they should practice reading and answering questions online. This is a great website with information similar to Unit 4.1. There are questions that follow.

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<http://www.ck12.org/life-science/Characteristics-of-Life-in-Life-Science/lesson/Characteristics-of-Life-Basic/r21/>

This University of Arizona site has a good review of the information presented by groups and images, too.

http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/cell_cycle.html

The two websites have animations of cell division.

http://www.cellsalive.com/cell_cycle.htm

<http://www.johnkyrk.com/mitosis.html>

Suggested Teacher Readings:

- GED Testing Service – GED Science Item Sample (to get an idea of what the test *may* be like)

<http://www.gedtestingservice.com/itemsamplerscience/>

- Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:

<http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf>

- Minnesota is getting ready for the 2014 GED test! – website with updated information on the professional development in Minnesota regarding the 2014 GED.

http://abe.mpls.k12.mn.us/ged_2014_2

- Essential Education's 2014 GED Test Curriculum Blueprint (PDF)

<http://www.passged.com/media/pdf/educators/curriculum-blueprint.pdf>

Lesson 4.2: Life Science – Cells & Cell Division

Unit 4.2 Handout 1 (9 pages total)

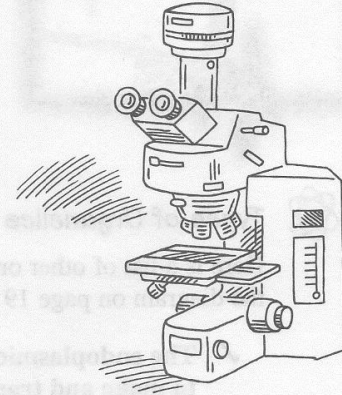
Cells

Brief #1: Cell Theory

Focus
Cell theory explains what cells are and where they come from.

Cells are the smallest units of life. All living things are made up of cells. But this was not always known to us. Sometimes the discovery of something can only come about because a piece of technology has been invented that allows us to study it. This is what happened with the discovery of cells.

Cells are very small. In fact, they are microscopic. In 1635, a scientist named Robert Hooke made a microscope and looked at a piece of cork through it. Hooke saw that the microscopic piece of cork looked like a honeycomb. It was made of lots of tiny little areas that he called cells.



The cells that Hooke observed were not alive. The first person to observe a live cell under a microscope was Anton van Leeuwenhoek. In 1674, he saw a type of algae called spirogyra. He called the tiny moving cells “animalcules.”



Cell Theory

The observations of Hooke, van Leeuwenhoek, and others led to the development of a theory about cells. **Cell theory states the following:**

- ✓ All living things are made of cells.
- ✓ Cells are the basic units of living things.
- ✓ All cells come from existing cells.

Vocabulary

1. cell theory
2. multi-cellular



What Cells Do

While cells may be microscopic, they perform important and complex functions in living organisms. Cells must get food and nutrients, remove waste from their systems, and grow and reproduce. When cells can't carry out the life functions, they can die.

There are some organisms that are made of one or a few cells. But there are much larger organisms, like humans, who are made up of trillions of cells. **An organism that is made up of many cells is called multi-cellular.** The prefix *multi* means “many.”

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Cells

Brief #2: Organelles

Focus

Organelles help cells to carry out their life functions.

Cells are made up of different parts that help them to carry out their life functions. A cell's life functions include the following:

- ✓ eating
- ✓ growing
- ✓ reproducing

The different parts of a cell that help it to carry out these functions are called **organelles**. You may already know about the organelle called the nucleus. **The nucleus is like the control center of the cell.** But there are many other organelles and each different organelle performs a specific job.



Types of Organelles

Here is a list of other organelles that carry out important functions within the cell. Look at the diagram on page 19 to see how all of these parts fit together.

- ✓ The endoplasmic reticulum is an organelle that helps to make and transport proteins and sugars around the cell.
- ✓ A vacuole is an organelle that stores and moves water around the cell and helps the cell to digest food and eliminate waste materials.
- ✓ The ribosome is an organelle that begins to turn materials in the cell into proteins.
- ✓ The lysosome is an organelle that has chemicals that help to digest worn-out organelles and other viruses and bacteria that might harm the cell.
- ✓ The organelle known as cytoplasm is a kind of liquid in which all of the other organelles are located.
- ✓ The cell membrane is an organelle that acts as a kind of skin for the other organelles. It is a barrier that keeps harmful things out of the cell, but it also lets helpful things into the cell.

Vocabulary

1. organelles
2. nucleus
3. endoplasmic reticulum
4. vacuole
5. ribosome
6. lysosome
7. cytoplasm
8. cell membrane
9. mitochondria
10. diffusion
11. osmosis

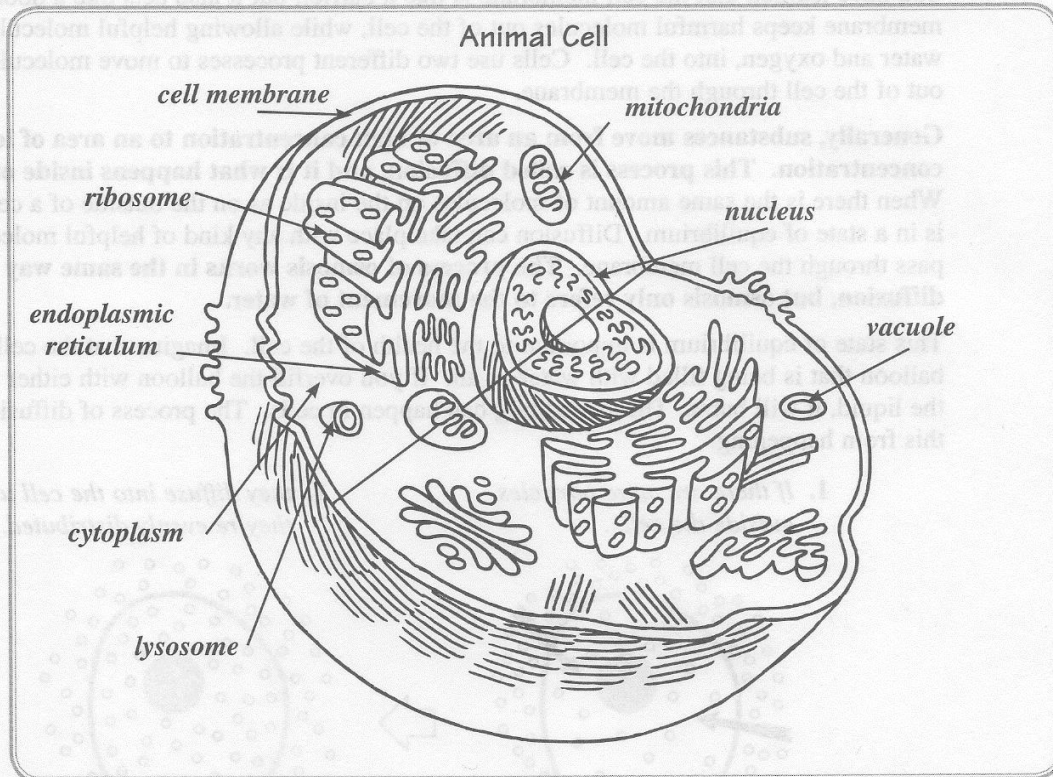
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Cells

Brief #2: Organelles (cont.)



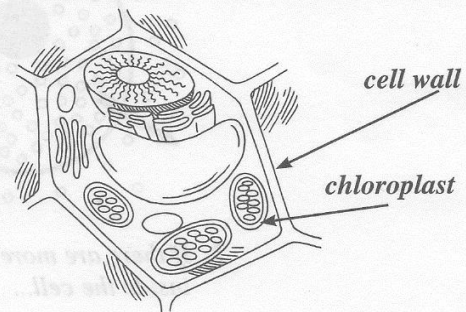
Types of Organelles (cont.)



Differences Between Cells

Not all cells are exactly the same. The job of the particular cells determines what kinds of organelles it will have. For example, muscle cells have a lot of mitochondrion because they need lots of energy to move. But neurons (nerve cells) have lots of dendrites. Dendrites are like the branches of a tree. They are responsible for sending and receiving chemical signals in the central nervous system.

Plant cells are also different from the cells of animals. A plant cell (pictured to the right) has a cell wall that helps the plant to keep its shape. It also has chloroplasts. These organelles contain the chlorophyll that the plant needs to make its own food.



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Cells

Brief #2: Organelles (cont.)



Diffusion and Osmosis

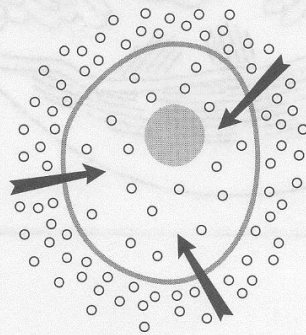
You have learned that the cell membrane is like a barrier, but it also acts like a door. The membrane keeps harmful molecules out of the cell, while allowing helpful molecules, like water and oxygen, into the cell. Cells use two different processes to move molecules in and out of the cell through the membrane.

Generally, substances move from an area of high concentration to an area of low concentration. This process is called diffusion, and it is what happens inside of cells.

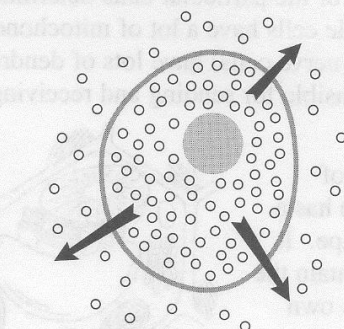
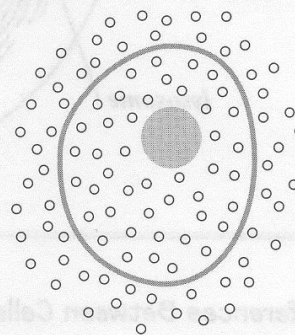
When there is the same amount of molecules on the inside as on the outside of a cell, the cell is in a state of equilibrium. Diffusion can take place with any kind of helpful molecules that pass through the cell membrane. **The process of osmosis works in the same way as diffusion, but osmosis only refers to the movement of water.**

This state of equilibrium is important to the health of the cell. Imagine that the cell is a balloon that is being filled with water or air. If you overfill the balloon with either the gas or the liquid, it will burst. The same thing can happen in cells. The process of diffusion keeps this from happening.

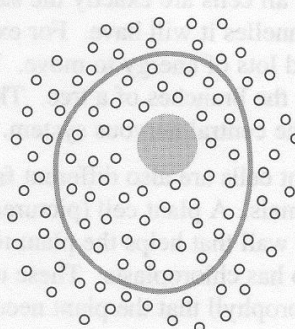
1. If there are more particles outside the cell...



2. they diffuse into the cell until they're evenly distributed.



3. If there are more particles inside the cell...



4. they move out of the cell until they're evenly distributed.

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Brief #3: Cell Division and Reproduction

Focus

New cells come from the division of cells that already exist.

It is possible that right at this moment you are over four feet tall. You will continue to grow taller and taller as you age until you stop growing at about the age of 21. But what makes you grow taller and taller with each passing year? The answer is the division of your cells.

Cells are very small—so small that they can't be seen without the aid of a microscope. But your cells have to do all of the same things that your body does to keep you healthy. Cells must take in oxygen and food, and they must remove waste products from their systems.

The tiny size of a cell actually makes it possible for the cell to perform all of these functions. Materials that the cell needs can move from organelle to organelle quickly because the distance between each organelle is so small. If cells continued to get bigger and bigger, it would make these processes more difficult.

Vocabulary

1. DNA
2. mitosis
3. chromosomes



The Division of Cells

If a single cell can only grow so big, then how is that multi-cellular organisms, like us, can grow bigger with age? The answer is that each cell in a multi-cellular organism divides. When a cell divides, it produces an exact duplicate of itself. New cells also replace old cells that are worn out.

Inside the nucleus of every cell is DNA. **DNA is a chemical molecule that stores all of the information and instruction about how the organism will grow and develop.** For instance, the DNA of an elephant is different from the DNA of a shark.

Cell division begins with a process called mitosis. **Mitosis means that the cell nucleus, which contains the DNA, divides. The DNA coils and forms tubular structures called chromosomes.**

Chromosomes come in pairs and each living organism has a different number of chromosomes. Human beings have 23 pairs of chromosomes; 46 chromosomes altogether. During mitosis, the nucleus of each new cell receives a full set of chromosomes. Mitosis is complete when the cytoplasm divides. So from one cell, two identical cells are produced. The flow chart on page 22 shows the different steps involved in the production of new cells.

Fast Fact

Average Height of
an American Male:
about 5'9"

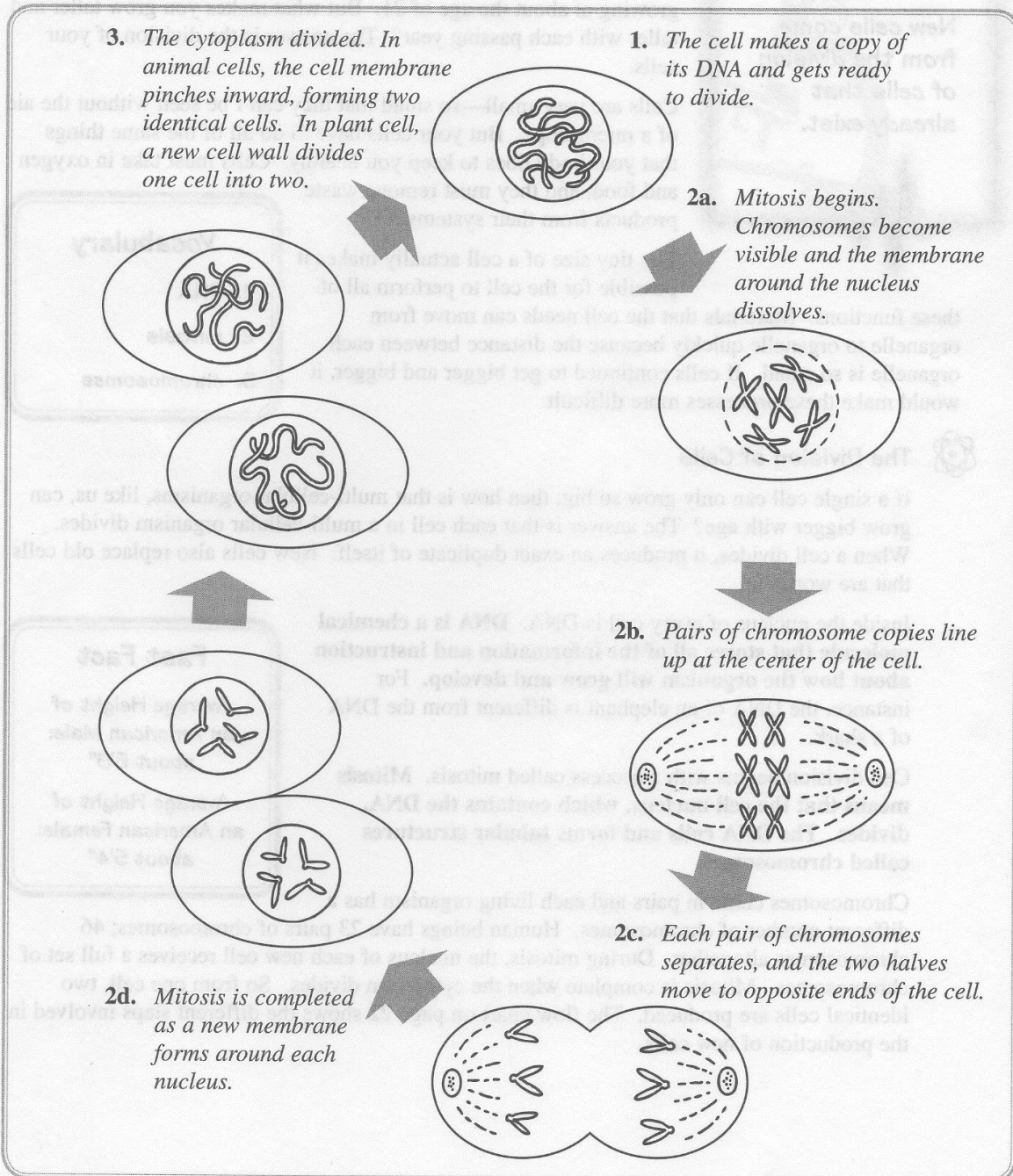
Average Height of
an American Female:
about 5'4"

Cells

Brief #3: Cell Division and Reproduction (cont.)



The Division of Cells (cont.)



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Cells

Vocabulary

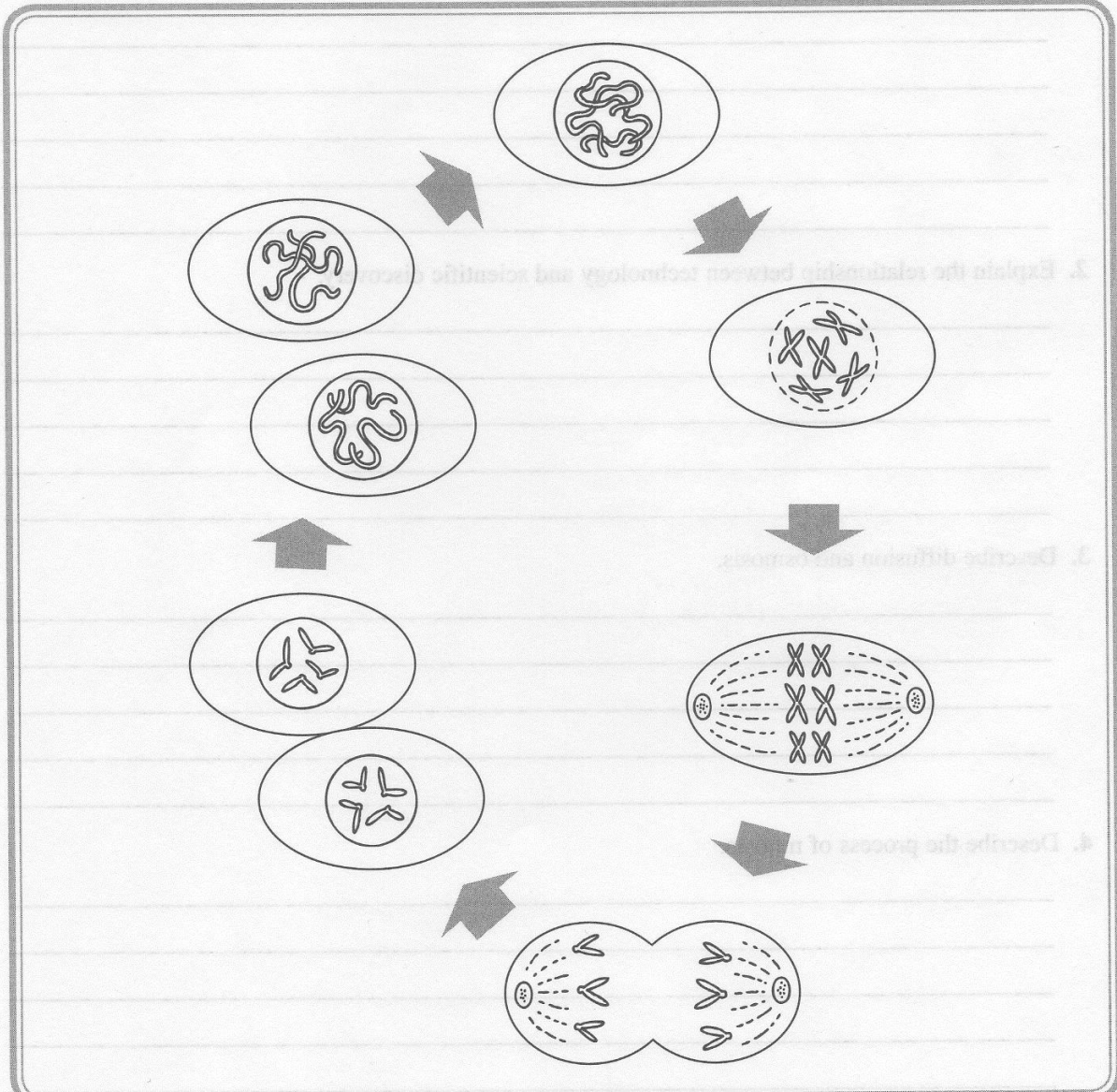
1. **cell theory**—a group of observations about the function, behavior, and reproduction of cells
2. **cell membrane**—an organelle that acts as a kind of skin for the other organelles
3. **chromosomes**—tubular structures formed from DNA that are copied during mitosis
4. **cytoplasm**—organelle of liquid in which all of the other organelles are located
5. **diffusion**—the movement of substances from an area of high concentration to an area of low concentration
6. **DNA**—chemical molecule in which cell instructions are stored
7. **endoplasmic reticulum**—organelle that transports proteins
8. **lysosome**—an organelle that has chemicals that help to digest worn-out organelles and other viruses and bacteria that might harm the cell
9. **mitochondria**—organelles that generate chemical energy that the cell uses to power other organelles
10. **mitosis**—division of the cell nucleus
11. **multi-cellular**—having many cells
12. **nucleus**—the control center of the cell
13. **organelles**—parts of cells that help them to carry out their life functions
14. **osmosis**—the movement of water through the cell's membrane
15. **ribosome**—an organelle that begins to turn materials in the cell into protein
16. **vacuole**—an organelle that stores and moves water around the cell, and helps the cell to digest food and eliminate waste materials

Cells

Graphic Assessment

Name: _____ Date: _____

Directions: Look carefully at the flow chart below. Describe what is happening in each illustration.



Notes from Group Presentations

Group A: Cell Theory

Group B: Organelles

Group C: Diffusion and Osmosis

Group D: Cell Division and Reproduction

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Unit 4.2 Handout 2 (2 pages total)

TEACHER ANSWER KEY

1. a
2. c
3. b
4. red blood cells
5. Answers may vary. Suggested answer: They both contain organelles and nucleuses, and they divide to reproduce.
6. Answers may vary. Suggested answer: Plant cells are surrounded by cell walls and they contain chlorophyll.